

Description of Additional Supplementary Files

Title: Supplementary Movie 1

Description: Simulation of von-Mise stress distribution of TMS during compression tests using finite element method (FEM). The results showed that TMS undergoes a transition from low-modulus first-stage spring loading to high-modulus second-stage pillar loading.

Title: Supplementary Movie 2

Description: Digital image correlation (DIC) dynamic tests of engineering strain of TMS along compression direction. The results validated that the two-stage deformation behavior, as designed and simulated, can be achieved by the 3D-printed Ti scaffolds, with the first stage realized by springs and the second stage by pillars.